POWER-DRIVEN ROTARY SELECTORS TOGETHER WITH ASSOCIATED BANKS REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers power-driven rotary selectors (202-, 203-, 207-, and 208-type selectors) and 11- and 27-type banks.

1.02 This section is reissued to revise the lubrication information, to add the information covering single-piece type feeder brushes provided with welded contacts, to revise List of Tools, Gauges, Materials and Test Apparatus, and to revise the procedures covering drive pull. Detailed reasons for reissue will be found at the end of the section.

1.03 Reference shall be made to Section 020-010-711 covering general requirements and definitions for additional information necessary for the proper application of the requirements listed herein.

1.04 ***Asterisk (*):*** Requirements are marked with an asterisk when to check for them would necessitate the dismantling or dismounting of apparatus or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons, or its performance indicates that such a check is advisable.

1.05 ***Preparation of KS-16832 L2 Lubricant:*** This lubricant is provided in 2-ounce and 1-pint containers. A small wide-mouth container, such as the 2-ounce jar in which the lubricant is available, should be used as a receptacle from which to dispense the lubricant. If allowed to stand more than 1 day without agitation, the lubricant ingredients tend to separate; therefore, before each day's use, shake the container of lubricant for approximately 30 seconds to insure mixing of the ingredients. The proper method of shaking the lubricant consists of repeated, rapid turning of the container to an upside down position and back to the upright position. If the lubricant from a 1-pint container is to be used, the lubricant must be mixed as just described before it is poured into the smaller container. Under storage conditions, the cover should be tight on the container.

1.06 ***One dip of KS-16832 L2 lubricant*** for the purpose of this section is the amount of lubricant retained on the KS-14164 brush after being dipped into the lubricant to a depth of 3/8 inch and scraped once against the side of the container as the brush is removed.

1.07 ***One discharge of grease*** for the purpose of this section is the amount of Veedol All-Purpose grease discharged from the 353C grease gun when the piston is fully depressed once.

1.08 ***Operate: Stop Magnet*** — The stop magnet is said to ***operate*** if, when current is connected to its winding, the associated armature moves until it touches the core.

1.09 ***Nonoperate: Stop Magnet*** — The stop magnet is said to ***nonoperate*** if, when current is connected to its winding, the associated armature does not move from the back stop screw.

1.10 ***Bank feeder brushes*** are those feeder brushes which are a part of the 11- or 27-type bank.

1.11 ***Detachable feeder brushes*** are those feeder brushes which are detachable and are fastened in position by the top selector mounting screw.

1.12 The 207- and 208-type selectors together with their associated banks replace the 1203-type selectors as follows.

207A together with associated banks replaces the 1203A selector.

207B together with associated banks replaces the 1203B selector.

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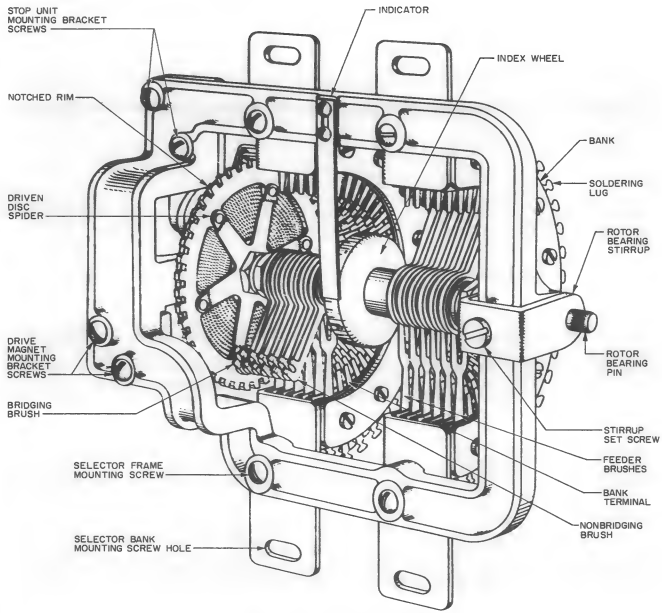

Fig. 1 – Front View of Selector

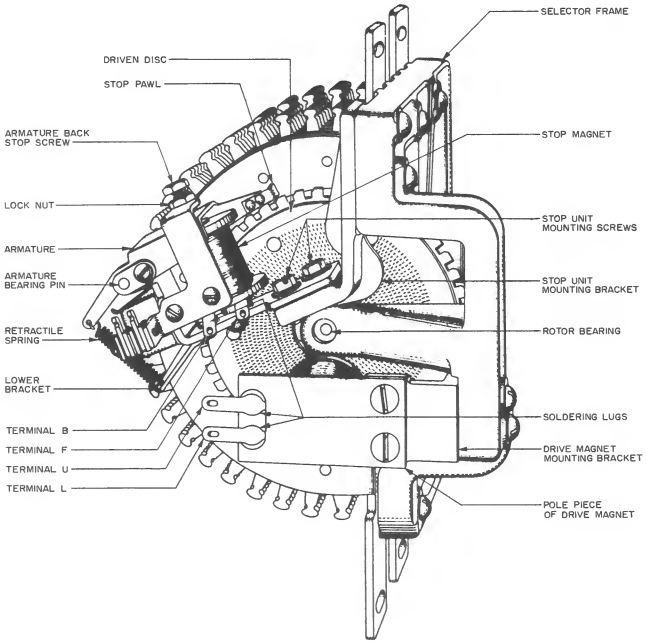

Fig. 2 – Side View of Selector

207C together with associated banks replaces the 1203E selector.
208A together with associated banks replaces the 1203C selector.
208B together with associated bank replaces the 1203D selector.

As a matter of convenience, whenever mention is made herein of a 202-, 203-, 207-, or 208-type selector the associated banks are included with the selector.

1.13 All rotor brush requirements shall be met on both ends of the rotor brush assembly.

2. REQUIREMENTS

2.01 ***Cleaning***

(a) The rotor bearings, the stop magnet armature bearings, the stop magnet core, and the associated armature surface shall be cleaned when necessary in accordance with approved procedures.

(b) The stop magnet contacts shall be cleaned when necessary in accordance with approved procedures.

(c) The bank terminals shall be cleaned when necessary, in accordance with approved procedures.

2.02 ***Lubrication***

(a) ***Fig. 3(A):*** The rotor bearings shall be adequately lubricated with Veedol All Purpose grease. When lubrication is necessary, one discharge of grease shall be applied.

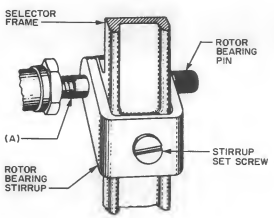

Fig 3 – Rotor Bearing

(b) ***Fig. 4(A):*** The stop magnet armature bearings shall be adequately lubricated with KS-16832 L2 lubricant. When lubrication is necessary, four dips of lubricant shall be applied, one at each side of each bearing.

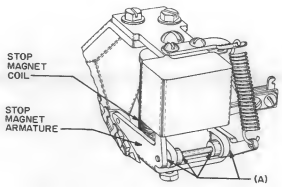

Fig. 4 – Stop Magnet

(c) ***Recommended Lubrication Intervals:*** After turnover it is recommended that the rotor bearings be lubricated at intervals of 6 months and the stop magnet armature bearings at intervals of 2 years. These intervals may be extended if periodic inspections have indicated that local conditions are such as to insure that (a) and (b) will be met during the extended interval.

2.03 ***Record of Lubrication:*** During the period of installation a record shall be kept, by date, of the lubrication of the selectors and this record shall be turned over to the telephone company with the equipment. If no lubrication has been done, it shall be so stated.

2.04 ***Endplay of Rotor Shaft:*** Fig. 3(A) — The rotor shaft shall be free to turn in its bearings and there shall be a perceptible end play of the shaft.

Gauge by eye and by feel.

To check the endplay of a rotor shaft, grasp the index wheel and attempt to move the rotor sideways.

2.05 ***Gap Between Core of Drive Magnet and Driven Disc:*** Fig. 5(A)

(a) With the drive magnet de-energized, and with the endplay of the rotor taken up toward the driving disc, the gap between the

core of the drive magnet and the driven disc shall be

Test	Max 0.045 inch
Readjust	Min 0.030 inch, Max 0.045 inch

Use the 87B gauge.

This requirement shall be met in all positions of rotation of the driving and driven discs.

To check this requirement, press the rotor to the left and attempt to insert the 87B gauge between the two parts with the magnet de-energized. The 0.030 inch step of the gauge should enter the gap and the 0.045 inch step should not enter or, if it does, it should bind.

(b) When the drive magnet is energized, the driven disc shall not touch the magnet core.

Gauge by eye.

This requirement shall be met in all positions of rotation.

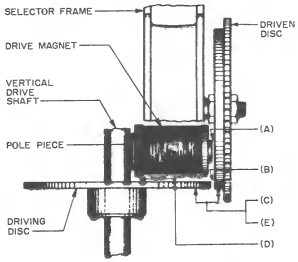

Fig. 5 – Relation Between Driving and Driven Disc

2.06 ***Gap Between Driving and Driven Discs:*** Fig. 5(B) — The gap between the driving and the driven disc with the driving disc and the rotor shaft in any position about their axes, shall be

Test	Min — Discs shall not touch Max 0.020 inch
Readjust	Min 0.005 inch, Max 0.020 inch

Use the 85A and 85C gauges.

The maximum limit shall be measured when the shafts are in the positions which bring the two discs farthest apart.

To check this requirement allow the vertical drive shaft to revolve and rotate the rotor slowly by hand making sure that the requirement is met in all positions. In checking for the maximum limit of the requirement, insert the 85C gauge in the gap and hold the gauge lightly between the fingers. If, in any position, the gauge and discs do not bind, it is an indication that the gap is too large.

2.07 ***Vertical Location of Driving Disc with Respect to Driven Disc*** (This requirement may be waived where discs are grooved if the driving performance of the switch is satisfactory): Fig. 5(C) — When the drive magnet is energized, the bottom of the driving disc shall not be below the edge of the driven disc nor more than 1/16 inch above it.

Gauge by eye.

This requirement shall be met in all positions of rotation of the rotor and driving disc.

2.08 ***Gap Between Driving Disc and Pole-Piece:*** Fig. 5(D) — With the driving disc in the position where it is nearest to the pole-piece of the drive magnet, the gap between the driving disc and the pole-piece shall be

Min — Shall not touch as gauged by eye. (Drive magnet energized)
Max — 0.010 inch as gauged with the 85B gauge. (Drive magnet de-energized)

Check this requirement, if possible, when no other magnets associated with the same vertical drive shaft are energized and with the vertical drive shaft revolving. To check the maximum value, insert the 85B gauge between the pole-piece and the driving disc. With the magnet de-energized, there must be a decided drag on the gauge in any position of rotation. To check the minimum limit, energize the drive magnet and make sure that the driving disc does not rub against the pole piece in any position of rotation.

2.09 ***Drive Pull:*** Fig. 5(E) — There shall be no appreciable slip between the driving and the driven discs when the drive magnet is energized.

Gauge by eye and by feel.

To check this requirement, connect ground to the ground side of the drive magnet coil to cause the selector to rotate. In some cases it may be necessary to block the stop magnet nonoperated in order to prevent its operation from stopping the rotation of the selector. Exert a slight pressure against the index wheel as the switch rotates. Check for slipping by sight and by feel.

Caution: Exercise care in applying pressure to the index wheel as excessive braking will cause the selector to slip, resulting in worn and polished surfaces on the driving and driven discs.

2.10 *Stop Unit Vertical Position*

(a) ***202-Type, 203A, 203B, 203E, and 207-Type Selectors:*** Fig. 6(A) — With the stop magnet in its operated position, the stop pawl shall not touch the bottom of any notch in the notched rim but shall enter any notch to a depth of

Min 1/32 inch

Gauge by eye.

To check this requirement, rotate the driven disc manually to the point where the gap between the notched rim and the stop pawl is smallest with the stop magnet nonoperated. Manually operate the stop magnet and at the same time, rotate the selector until the stop pawl engages the nearest notch in the notched rim, taking care not to rotate the driven disc backward. Check that the stop pawl does not touch the bottom of the notch. Similarly, rotate the driven disc to the point where the gap between the notched rim and stop pawl is greatest. Operate the stop magnet and make sure that the stop pawl engages the notched rim as specified.

(b) ***203C, 203D, and 208-Type Selectors:*** Fig. 7(A) — With the stop magnet armature in its operated position, the stop pawl shall not touch the notched rim in the closest position, and in all positions the clearance between these parts shall be

Max 0.022 inch

Gauge by eye and use the 87A gauge.

To check this requirement, manually operate the stop magnet and rotate the driven disc manually through several revolutions and observe that the requirement is met.

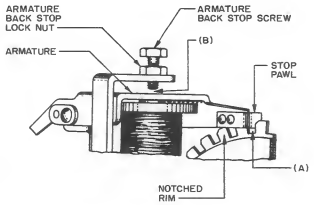

Fig. 6 – Vertical Position of Stop Unit (202-Type, 203A, B, E and 207-Type Selectors)

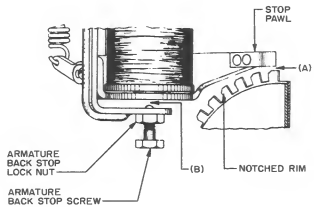

Fig. 7 – Vertical Position of Stop Unit (203C, D and 208-Type Selectors)

2.11 *Armature Back Stop Screw Position*

(a) ***202-Type, 203A, 203B, 203E, and 207-Type Selectors:*** Fig. 8(A) — With the stop magnet armature in the normal (nonoperated) position, the stop pawl shall not touch the notched rim in the closest position and, in all positions, the clearance between the stop pawl and the notched rim shall be

Max 0.022 inch

Gauge by eye and use the 87A gauge.

To check this requirement, manually rotate the selector several revolutions and observe that the pawl does not touch the notched rim at any point during a revolution and that the maximum requirement is also met.

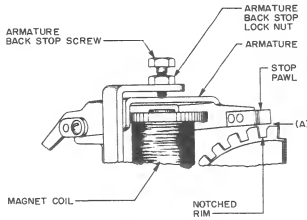

Fig. 8 – Position of Armature Back Stop (202-Type, 203A, B, E, and 207-Type Selectors)

(b) *203C, 203D and 208-Type Selectors:* Fig. 9(A) — With the stop magnet armature in the normal (nonoperated) position, the stop pawl shall not touch the bottom of the notch in the notched rim but shall enter the notch to a depth of

Min 1/32 inch

Gauge by eye.

This requirement shall be met on all notches of the notched rim.

To check this requirement, manually operate the stop magnet and rotate the selector. The point of minimum intrusion is found by observing the point where the maximum gap exists between the teeth and the pawl while the maximum intrusion is checked by noting the minimum gap between the teeth and the pawl.

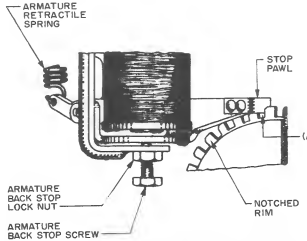

Fig. 9 – Position of Armature Back Stop (203C, D and 208-Type Selectors)

2.12 *Gap Between Armature and Back Stop Screw:* Fig. 6(B) and 7(B) — With the armature in the operated position, the gap between the armature and the back stop screw shall be

Test — Max 0.045 inch
Readjust — Max 0.040 inch

Use the 87A and 87B gauges.

To check this requirement, operate the armature manually and attempt to insert the gauge between the armature and the armature back stop. The 87A gauge should not enter or should fit snugly in this position.

2.13 *Contact Alignment:* Fig. 10(A) — Contacts shall line up so that the point of contact falls wholly within the boundary of the opposing contact.

Gauge by eye.

Fig. 10 – Contact Alignment

2.14 *Contact Pressure of Stop Unit Springs:* Fig. 11(A) and 12(A) — There shall be a pressure between contacts normally closed or between normally open contacts when they are closed of

Test Min 30 grams
Readjust Min 35 grams

Use the 79C gauge.

Note: 203C, 203D, 208A, and 208B Selectors: This requirement shall be met with the stop pawl resting against the outer edge of the notched rim in any position of its rotation. Use the 70D gauge.

2.15 *Pressure of Long Contact Spring Against Insulating Bushing — 203C, 203D, 208A, and 208B Selectors:* Fig. 12(B) — With the armature in the normal position, the pressure of the long contact spring against the insulating bushing on the armature shall be

Test Max 22 grams
Readjust Max 20 grams

Use the 79C gauge.

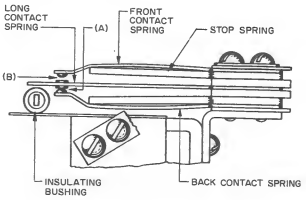

Fig. 11 – Stop Unit Spring Assembly

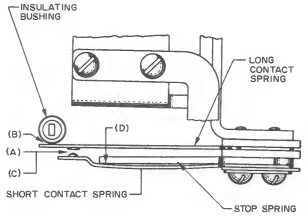

Fig. 12 – Stop Unit Spring Assembly

2.16 ***Contact Separation Between Stop Unit Springs***

(a) ***202-Type, 203A, 203B, 207A, and 207B Selectors:*** With the armature in the operated position and with the stop pawl resting in a notch of the notched rim, the separation between the contacts shall be

Test	Min 0.008 inch
Readjust	Min 0.010 inch

Use the 88A and 88B gauges.

(b) ***203C, 203D, 208A, and 208B Selectors:*** Fig. 12(C) — With the armature in its normal position, the separation between the contacts shall be

Test	Min 0.010 inch
Readjust	Min 0.012 inch

Use the 74D and 88B gauges.

(c) ***203E and 207C Selectors:*** Fig. 11(B) — With the stop pawl resting against the edge of the notched rim in any position of rotation, the separation between normally open contacts shall be

Test	Min 0.010 inch
Readjust	Min 0.012 inch

Use the 74D and 88B gauges.

(d) ***203E and 207C Selectors:*** With the armature in the operated position and with the stop pawl resting in any notch of the notched rim, the separation between normally closed contacts shall be

Test	Min 0.010 inch
Readjust	Min 0.012 inch

Use the 74D and 88B gauges.

2.17 ***Short Contact Spring Position:*** Fig. 12(D) — On selectors equipped with spring stops, the contact spring shall bear against the outer end of its spring stop when the contact is open and shall not bear against the outer end of its spring stop when the contact is closed.

Gauge by eye.

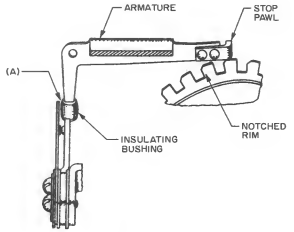

Fig. 13 – Armature Position

2.18 ***Gap Between Insulating Bushing and Long Contact Spring — 202-Type, 203A, 203B, 203E, and 207-Type Selectors:*** Fig. 13(A) — The insulating bushing on the armature shall not touch the long contact spring when the stop pawl is resting on the edge of the notched rim in any position of its rotation.

Gauge by eye.

To check this requirement, operate the armature manually and place the stop pawl on the outer edge of the notched rim. Check the requirement at the point of the notched rim where the gap between the stop pawl and the rim is greatest.

2.19 ***Stop Unit Horizontal Adjustment***

(a) All brushes shall make contact with their respective terminals when the stop pawl is engaged with the stopping edge of any notch in the notched rim.

Gauge by eye.

(b) ***Fig. 14(A):*** The bridging brushes shall not make contact with adjacent terminals when the stop pawl is engaged with the stopping edge of any notch in the notched rim.

Gauge by eye.

(c) ***Fig. 14(B):*** The trailing edges or tips of bridging brushes shall rest approximately on the center of the terminal with which they are making contact.

Gauge by eye.

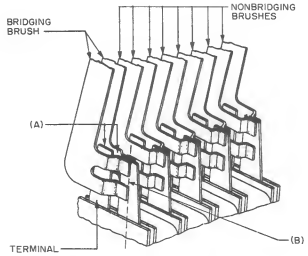

Fig. 14 – Position of Rotor Brushes

2.20 ***Armature Retractile Spring Tension — 203C and 203D and 208-Type Selectors:*** Fig. 15(A) — With the armature resting against the armature back stop screw, the tension of the armature retractile spring, measured at the stop pawl, shall be

Test Min 225 grams
Readjust Min 250 grams

Use the 79B gauge.

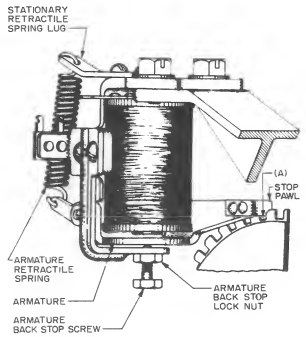

Fig. 15 – Armature Retractile Spring

2.21 ***Stop Magnet Electrical Requirements***

(a) ***202-Type, 203A, 203B, 203E, and 207-Type Selectors:*** The stop magnet shall meet the set of electrical requirements listed below applying to the particular circuit conditions involved.

CIRCUIT CONDITION		OPERATE AMPERE	NONOPERATE AMPERE
No relay in parallel with stop magnet	Test	0.073	0.057
	Readjust	0.070	0.060
Combination of stop magnet in parallel with 2000-ohm relay	Test	0.085	0.064
	Readjust	0.080	0.067
Combination of stop magnet in parallel with 1800-ohm relay	Test	0.085	0.064
	Readjust	0.080	0.067
Combination of stop magnet in parallel with 1500-ohm relay	Test	0.090	0.066
	Readjust	0.085	0.069

(b) ***203C, 203D, and 208-Type Selectors:*** The stop magnet shall operate on

Test 0.155 Ampere
Readjust 0.140 Ampere

2.22 ***Alignment of Tips of Rotor Brushes***

(a) ***Fig. 16(A):*** The trailing edges or tips of all nonbridging brush members shall be in approximate (±.010 inch) alignment. The reference line used as a basis for this measurement shall be parallel to the axis of the rotor shaft.

Gauge by eye.

(b) ***Fig. 16(B):*** The trailing edges or tips of the bridging brush members shall be advanced in the direction of normal rotation beyond the nonbridging brushes as follows

202C and 202D selectors	— Min 1/32 inch Max 3/64 inch
202E and 203-type selectors	— Min 0.000 inch Max 0.020 inch
207 and 208-type selectors	— Min 0.000 inch Max 0.010 inch

Gauge by eye.

The rotor brush members are 0.013 inch thick.

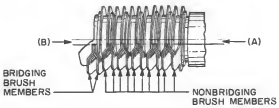

Fig. 16 – Alignment of Types of Rotor Brushes

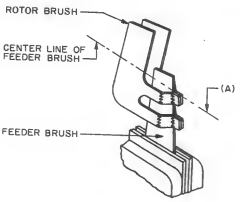

Fig. 17 – Rotor Brush Alignment

2.23 ***Rotor Brush Alignment:*** Fig. 17(A) — The junction between each pair of rotor brush springs shall line up with the center line of the associated bank feeder brush within 0.014 inch when the brushes are in the position in which they are about to pass onto the feeder brushes. In case the bank feeder brushes have been cut away, this requirement shall apply to the first row of bank terminals.

Gauge by eye.

The bank feeder brushes and bank terminals are 0.014 inch thick.

2.24 ***Feeder Brush Position:*** Each feeder brush shall meet the requirements listed in Table A for the particular type of feeder brushes involved.

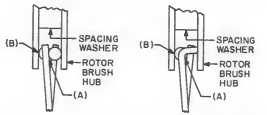

Fig. 18a – Single-Piece Type Feeder Brush — Balanced Type With Two Welded Contacts

Fig. 18b – Single-Piece-Type Feeder Brush — Balanced Type With One Welded Contact and One Formed Tip

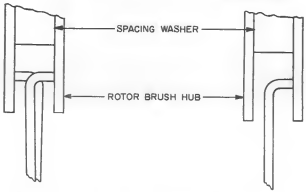

Fig. 19a – Single-Piece-Type Feeder Brush — Balanced Type With Two Formed Tips

Fig. 19b – Single-Piece-Type Feeder Brush — Nonbalanced Type

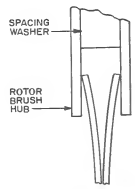

Fig. 20 – Two-Piece-Type Feeder Brush

TABLE A

BANK FEEDER BRUSHES		DETACHABLE FEEDER BRUSHES		
Single Piece Type (Fig. 18a 18b and 19a)	Single Piece Type (Fig. 19b)	Two Piece Type (Fig. 20)	Single Piece Type (Fig. 19a)	Single Piece Type (Fig. 19b)
(a)	(a)	(a)	(a)	(a)
	(b)			(b)
			(c)	(c)
(d)	(d)	(d)	(d)	(d)
(e)	(e)	(e)		
(f)	(f)	(f)	(f)	(f)
			(g)	(g)
			(h)	(h)

(a) ***Fig. 21(A):*** The prongs of the feeder brush shall not touch the spacing washers on the rotor at any point in the revolution of the rotor.

Gauge by eye.

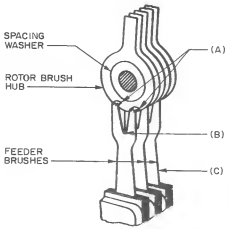

Fig. 21 – Rotor and Feeder Brushes

(b) ***Fig. 21(B):*** When the feeder brush is pushed away from the rotor with pressure applied on the center line of the feeder brush and close to the crotch, the two prongs shall leave the rotor at the same time.

Gauge by eye.

(c) ***Fig. 22A:*** The points of contact between the feeder brushes and the rotor brush hub shall be

Min 0.015 inch

within the outside edge of the rotor brush hub.

Gauge by eye.

The bank feeder brushes are 0.014 inch thick.

(d) Except where otherwise specified, the clearance between all parts of the feeder and rotor brushes except contacting surfaces thereon shall be

Min 0.005 inch

Gauge by eye.

(e) ***Fig. 21(C):*** That part of the bank feeder brush over which the rotor brushes pass shall be in alignment with the bank terminals within 0.010 inch.

Gauge by eye.

(f) The contacting surfaces of the feeder brushes shall make contact with and be parallel to the face of the rotor brush hub throughout the revolution of the rotor brush hub.

Gauge by eye.

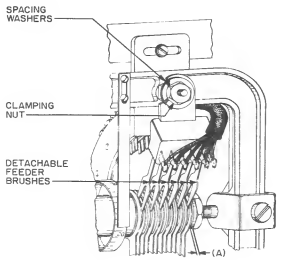

Fig. 22 – Detachable Feeder Brushes

(g) When one end of the nonbridging rotor brushes is contacting the feeder brushes sufficiently to cause the rotor brushes to begin to separate, the brushes on the opposite end of the rotor shall not touch the bank terminals.

Gauge by eye.

(h) With one end of the rotor brushes resting on the 5th row of bank terminals, the center line of that part of the feeder brush over which the rotor brush passes shall line up with the junction of the associated pair of rotor brush springs within 0.010 inch.

Gauge by eye.

The feeder brushes are 0.014 inch thick.

2.25 ***Feeder Brush Tension***

(a) ***Single-Piece-Type Feeder Brushes per Fig. 18a, 18b, 19a***

(1) ***Fig. 18a(A), 18b(A), 23(A):*** When the rotor brush assembly is approximately centered in the frame, the tension of the front prong of the feeder brush against the associated rotor brush hub, measured just below the hub of the rotor shall be:

Min 25 grams
Max 40 grams

Use the 70D gauge.

(2) ***Fig. 18a(B), 18b(B), 23(B):*** The rear prong shall reliably contact the rotor brush hub.

Gauge by eye and by feel.

To check this requirement, rotate the selector to a position where the feeder brushes are readily accessible and also where the rotor brushes are not in contact with the feeder brushes. To check the tension of the front prong, apply the 70D gauge directly beneath the offset portion of the prong. Check that the rear prong is making contact with the rotor brush hub with the KS-6320 orange stick.

(b) ***Single-Piece-Type Feeder Brushes per Fig. 19b***

(1) ***Fig. 21(B):*** The tension of each feeder brush against the associated rotor brush hub measured at a point on the center line of the feeder brush and close to the crotch shall be

Test	Min 65 grams, Max 90 grams
Readjust	Min 70 grams, Max 90 grams

Use the 70J gauge.

This requirement shall be checked with the rotor in its normal position with respect to side play.

To check this requirement, rotate the selector to a position where the feeder brushes are readily accessible and also where the rotor brushes are not in contact with the feeder brushes. When checking the tension of the No. 1 brush, the 70J gauge cannot be used. Therefore, the requirement on this brush is met if the tension, as determined by the KS-6320 orange stick, is approximately the same as the tension of another brush which meets the requirements when checked by the 70J gauge.

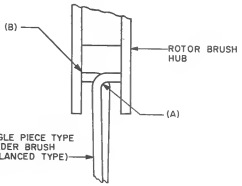

Fig. 23 – Single-Piece-Type (balanced type) Feeder Brush Tension

(c) ***Two-Piece-Type Feeder Brushes Per Fig. 20***

*(1) With the adjacent brushes held away, the spread of the contact ends of the two-piece-type brushes shall be approximately 3/8 inch.

Gauge by eye.

2.26 ***Rotor Brush Tension:*** Fig. 24(A) — The tension of each brush member measured at a point approximately midway between the

prongs of the brush member, with the brushes on the topmost row of terminals shall be

Test Min 20 grams, Max 50 grams
Readjust Min 25 grams, Max 50 grams

Use the 70D gauge.

On selectors equipped with detachable feeder brushes, it will be satisfactory to check this requirement with the brushes on the detachable feeder brushes instead of on the topmost row of terminals.

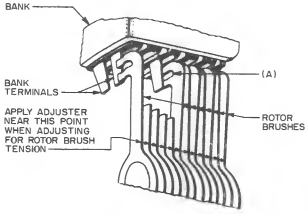

Fig. 24 – Rotor Brush Assembly

2.27 ***Rotor Brush Prong Contact:*** Fig. 25(A) — At least one of the two prongs of each individual brush member shall make contact with the associated bank feeder brush. The other prong shall not be away from the feeder brush more than

Test Max 0.005 inch
Readjust Shall touch

Gauge by eye.

In case the bank feeder brushes have been cut away, this requirement shall apply to the first row of bank terminals.

To check this requirement in doubtful cases, touch the prongs of the brushes with the end of the KS-6320 orange stick and note whether or not both prongs make contact with the feeder brush or bank terminal when the feeder brushes are cut away. The "feel" of the tool will be an aid to the visual check for the requirement.

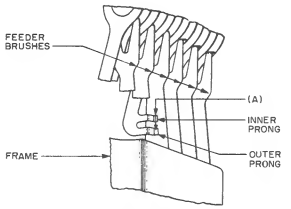

Fig. 25 – Relation Between Rotor Brush and Feeder Brushes

2.28 ***Toeing of Bridging Brushes:*** Fig. 26(A) — When the bridging rotor brush is not contacting with the feeder brush or bank terminals, both pairs of trailing edges or tips of the brush shall "toe out" but the maximum separation between each pair of tips shall not exceed 0.010 inch when the brush members are making contact with each other.

Gauge by eye.

Note: At least one, but not necessarily both pairs of contacting surfaces of the brush shall make contact with each other.

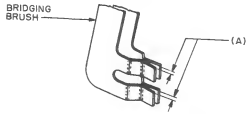

Fig. 26 – Bridging Brush

2.29 ***Heel Spacing***

(a) ***Fig. 27(A):*** The clearance between brush members of adjacent pairs when the brushes are in contact with the bank terminals shall be

Min 0.030 inch

Gauge by eye.

This requirement shall be checked on the topmost row of terminals. On selectors equipped

with detachable feeder brushes, it will be satisfactory to check this requirement on the detachable feeder brushes.

The bank terminals are 0.014 inch thick.

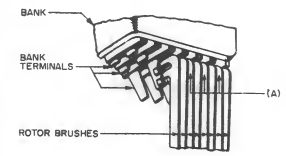

Fig. 27 – Rotor Brush Heel Spacing

(b) ***Fig. 28(A):*** The heels of rotor brush members shall clear the sides of the bank feeder brushes just before the rotor brushes engage the feeder brushes by

Min 0.015 inch

Gauge by eye.

In case the bank feeder brushes have been cut away, this requirement shall apply on the first row of bank terminals.

The bank terminals are 0.014 inch thick.

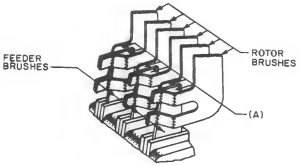

Fig. 28 – Rotor Brush Heel Spacing

2.30 ***False Contacting***

(a) ***Nonbridging Brushes:*** Fig. 29(A) — The clearance between the heels of nonbridging brush members and their associated bank terminals when their contacting edges are in contact with each other between the bank feeder brush and the 1st bank terminal, the 11th and 12th terminals and the 2nd and 3rd terminals from the top of the bank shall be

Min 0.015 inch

Gauge by eye.

In case the bank feeder brushes have been cut away, this requirement shall apply to the 1st and 2nd bank terminals.

The bank terminals are 0.014 inch thick.

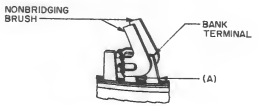

Fig. 29 – Clearance Between Rotor Brushes and Bank Terminals

(b) ***Bridging Brushes:*** Fig. 30(A) — On all selectors equipped with single-piece narrow-type bank feeder brushes, the heels of bridging brushes shall clear the first bank terminal just before the rotor brushes engage the feeder brushes by:

Min 0.015 inch

In case the bank feeder brushes have been cut away, this requirement shall apply to the second row of terminals.

The bank terminals are 0.014 inch thick.

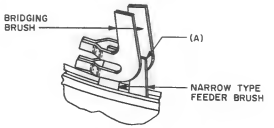

Fig. 30 – Clearance Between Rotor Brushes and Bank Terminals

2.31 ***Application of P-10A768 Attachable Stop:*** Fig. 35

(a) The attachable stop shall be applied in the field to the armature of the stop magnet of 202-, 203-, 207-, and 208-type selectors

when the magnet fails to release properly, as judged by circuit operation, and this failure is due to a worn or missing core cap on the magnet.

(b) The stop shall lie flat along the rear edge of the armature, see Fig. 35(A).

(c) The stop shall be located so that the end of the back stop screw is entirely within the hole in the stop when the armature is in the unoperated position.

Gauge by eye and feel.

3. ADJUSTING PROCEDURES

3.001 *List of Tools, Gauges, Materials, and Test Apparatus*

CODE OR SPEC No.	DESCRIPTION
TOOLS	
103	Combination Pin Wrench and Screwdriver
179	Spring Adjuster
206	30° Offset Screwdriver
207	90° Offset Screwdriver
310B (2 reqd)	9/32 Inch Hex. Open Double-End Offset Wrench
325B	Adjuster
353C	Grease Gun (must be equipped with 570A straight nozzle)
358	Cleaning Tool
359	Magnet Core and Armature Cleaning Tool
363 (2 reqd)	Spring Adjuster
376A	Dental Mirror
378A	Friction Surface Restorer
417A	1/4- and 3/8-Inch Hex. Open Double-End Flat Wrench
456A	Adjuster
510C	Portable Lamp [must be equipped with 561A straight tip and W2BL (48V) cord]
KS-6098	Wrench
KS-6320	Orange Stick
KS-7782	Pliers
KS-14164	Brush
R-1482	File
—	P-Long Nose Pliers (or the replaced 6-1/2 inch P-long-nose pliers) ←
—	3-Inch C Screwdriver (or the replaced 3-Inch Cabinet Screwdriver) ←
—	4-Inch E Screwdriver (or the replaced 4-Inch Regular Screwdriver) ←
GAUGES	
70D	50-0-50 Gram Gauge
70J	0-150 Gram Gauge (or the replaced 70E) ←
74D	Thickness Gauge Nest
79B	0-1000 Gram Push-Pull Tension Gauge
79C	0-200 Gram Push-Pull Tension Gauge
85A	0.005-Inch Thickness Gauge
85B	0.010-Inch Thickness Gauge
85C	0.020-Inch Thickness Gauge
87A	0.022-Inch and 0.040-Inch Double-End Thickness Gauge
87B	0.030-Inch and 0.045-Inch Double-End Thickness Gauge
88A	0.008-Inch Offset Thickness Gauge
88B	0.010-Inch Offset Thickness Gauge
MATERIALS	
KS-2423	Cloth
KS-7860	Petroleum Spirits
KS-14666 (or the replaced D-98063)	Cloth ←
KS-16832 L2	Lubricant ←
—	Veedol All Purpose Grease (or the replaced Veedol Medium Cup Grease) ←

CODE OR SPEC NO.	DESCRIPTION
MATERIALS	
→KS-19566 L1	Emulsion
P-10A768	Attachable Stop
P-456704	Retaining Spring
—	Hardwood Tooth Picks, Flat At One End and Pointed at Other
—	22 Gauge Bare Tinned Copper Wire
→—	1 Gallon Can
TEST APPARATUS	
35C	Test Set

3.002 ***Use of Portable Lamp:*** The 510C portable lamp and 376A dental mirror may be used in connection with the visual inspections specified in Part 2. In using the 510C portable lamp, make sure that the proper cord is used for the available voltage.

3.003 ***Make Busy Information:*** Before making any of the inspections or readjustments specified herein, ascertain whether or not it is necessary to make any of the circuits busy. Circuits which are so affected should be made busy in the approved manner and the necessary relays should be held operated or nonoperated to isolate the selector circuit.

3.004 ***Moving Rotor Brushes by Hand:*** In all cases where it is necessary to move the rotor brushes by hand, proceed as follows, raise or lower the pawl by hand as required until it clears the notched rim of the driven disc. Then while holding the pawl in this position, apply a light downward pressure with the fingers on the notched rim and rotate the rotor brushes to the desired position.

3.005 The KS-19566 L1 emulsion must be diluted as follows before using as covered in 3.09. Place about 1/2 gallon of clean water in the gallon can. Thoroughly shake the emulsion, add 2 ounces of it to the water in the can, and stir lightly. The bottle containing the KS-19566 L1 emulsion is provided with a screw cap which has a 1-ounce capacity for measuring the emulsion. Because one component of the emulsion solution will evaporate if it is kept in an open container, do not use the solution after more than 8 hours from the time of preparation.

3.01 ***Cleaning*** (Reqt 2.01)

(1) ***Rotor Bearings:*** To clean the bearings, loosen the stirrup setscrew with the 4-inch E screwdriver and back out the bearing pin just enough to permit insertion of a toothpick at both bearings. Tighten the setscrew. Dip the flat end of a clean toothpick in KS-7860 petroleum spirits and apply the petroleum spirits to the bearings. Use a clean toothpick for each bearing. After cleaning the bearings, lubricate as covered in requirement 2.02(a). Loosen the stirrup setscrew and position the bearing pin to meet the rotor endplay requirement 2.04. Securely tighten the setscrew.

(2) ***Stop Magnet Armature Bearings:*** Dip the flat end of a clean toothpick in KS-7860 petroleum spirits and apply the petroleum spirits to each bearing. After cleaning, lubricate the bearings as covered in requirement 2.02(b)

(3) ***Stop Magnet Core and Armature:*** Insert the 359 magnet core and armature cleaning tool between the magnet core and the associated surface of the armature. Energize the magnet and then withdraw the cleaning tool. Repeat this operation several times to remove dirt and loose metallic particles. Do not perform this cleaning operation if an attachable stop is mounted on the armature.

(4) ***Stop Magnet Contacts:*** Clean the stop magnet contacts in accordance with approved procedures.

(5) ***Bank Terminals:*** Clean the bank terminals in accordance with approved procedures.

3.02 ***Lubrication*** (Reqt 2.02)

Rotor Bearings

(1) Loosen the stirrup setscrew with the 4-inch E screwdriver and shift the rotor to the right just sufficiently to allow the insertion of the nozzle of the 353C grease gun. Then slightly retighten the setscrew. Rest the end of the nozzle against the bearing surface of the rotor shaft and depress the piston to the end of its stroke. Then release the piston.

(2) In removing the grease gun, draw the nozzle over the bearing surface of the rotor shaft so that the grease will be deposited on

the bearing surface. Make sure that the grease does not reach the driving or the driven discs. Also exercise care to prevent misplacement of the feeder brushes.

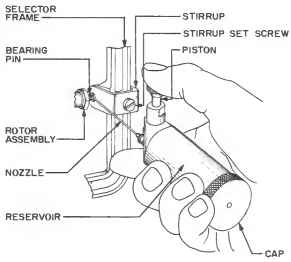

Fig. 31 – Method of Using the 353C Grease Gun

(3) Shift the rotor to the left and apply the grease to the bearing surfaces of the bearing pin as shown in Fig. 31.

(4) After the rotor bearings have been lubricated, reset the bearing pin and tighten the stirrup setscrew making sure that requirement 2.04 is met.

Stop Magnet Armature Bearings

(5) Make sure that the container of KS-16832 L2 lubricant has been shaken as covered in 1.05.

(6) Shift the stop magnet armature on the shaft so as to take up the endplay of the armature toward one side and apply the specified quantity of KS-16832 L2 lubricant to each side of the bearing.

(7) Take up the endplay of the armature in the opposite direction and apply the specified quantity of KS-16832 L2 lubricant to each side of the other bearing.

3.03 ***Record of Lubrication*** (Reqt 2.03)
(no procedure)

3.04 ***Endplay of Rotor Shaft*** (Reqt 2.04)

(1) If the requirement is not met, loosen the stirrup setscrew with the 4-inch E screwdriver. Reposition the bearing pin to obtain the required endplay. Hold the pin in this position and securely tighten the stirrup setscrew. Recheck requirement 2.04.

3.05 ***Gap Between Core of Drive Magnet and Driven Disc*** (Reqt 2.05)

(1) If the requirement is not met, the trouble may be due to the position of the magnet, to a wobbly driven disc, or to a worn bearing.

(2) To change the location of the magnet, loosen the two round head machine screws which hold the drive magnet mounting bracket to the selector frame with the 4-inch E screwdriver and shift the bracket as required to the right to decrease the gap and to the left to increase the gap. Then tighten the mounting screws securely. Make sure that the magnet core is parallel to the face of the driven disc and then tighten the screws. If a magnet is shifted to the left as far as possible and the requirement is still not met, proceed as follows. Obtain a P-456704 retaining spring. Cut it into two parts, cutting across the spring at a point about 1/8-inch above the junction of the fork in the spring. Loosen the magnet mounting screws with the 4-inch E screwdriver and slide the spring over the two screws between the heelpiece and the frame and tighten the magnet mounting screws securely.

(3) If the requirement is not met due to a wobbly driven disc, revolve the driven disc to the point where the gap between driving and driven discs is a minimum and then, with the index finger and thumb on the notched rim, force the top of the disc towards the left and the bottom of the disc towards the right. Revolve the disc to check for wobble and, if necessary, repeat the adjusting operation until the wobble is reduced sufficiently to meet the requirement. Then proceed as covered in (2).

(4) Do not take out the rotor assembly to adjust for a wobbly disc or for any other reason unless it is absolutely necessary. Wobbly driven discs can usually be corrected as covered in (2). If necessary to remove the driven disc for any reason, however, proceed as covered in Section 026-740-801.

(5) If the requirement still cannot be met, it is probably due to a worn bearing. Replace the bearing as covered in Section 026-740-801.

(6) If there is insufficient clearance between the vertical drive shaft and the terminals of the magnet, give consideration to replacing the magnet as covered in Section 026-740-801.

(7) When any change is made in the adjustment of the driven disc make sure that requirement 2.06 is met.

3.06 ***Gap Between Driving and Driven Discs*** (Reqt 2.06)

(1) Loosen the selector bank mounting screws with the 4-inch E screwdriver and move the entire selector as required. Tighten the mounting screws only sufficiently to hold the selector in position and recheck the requirement. If necessary, shift the selector and, when the adjustment is satisfactory, securely tighten the mounting screws.

(2) If the requirement cannot be met because of a wobbly driven disc, correct this condition as covered in 3.05.

3.07 ***Vertical Location of Driving Disc with Respect to Driven Disc*** (Reqt 2.07)

3.08 ***Gap Between Driving Disc and Pole-Piece*** (Reqt 2.08)

General

(1) Since it will be necessary to stop the vertical drive shaft when adjusting for requirement 2.07, make this adjustment at a time when it will be least likely to interfere with service.

(2) Before making any adjustments for these requirements, check all rotary selectors in the bay to see whether these requirements are met. Also check the rotary selectors with respect to grooved driven discs and shiftable magnet pole pieces since these conditions affect the action to be taken.

(3) If the discs are not grooved, proceed as covered in (7) through (12). If the discs are grooved, proceed as covered in (13).

(4) If the majority of the discs are too high or too low with respect to the driven disc or pole pieces or both, it is an indication that the position of the vertical drive shaft has shifted. In such cases determine whether the provisions of the section covering vertical drive shafts and associated apparatus will permit raising or lowering the vertical drive shaft sufficiently to obtain a mean adjustment for a majority of the discs. If so, proceed to raise or lower the vertical drive shaft as covered in that section and as covered in (7) and (8).

(5) If the provisions of the section do not permit sufficient movement of the vertical drive shaft, readjust the individual driving discs as covered in (9) through (12).

(6) When adjusting to meet either of these requirements, recheck to see that the other rquiremenet is still met.

Majority of Driving Discs Too High or Too Low With Respect to Pole Piece or Driven Disc

(7) On later installations the driving disc above the second bearing from the bottom of the vertical drive shaft is used as a reference disc for locating the vertical drive shaft with respect to the selector driven discs. On frames where the selector position opposite this driving disc is unequipped, the disc nearest the second bearing and associated with an equipped position may have been used as a reference disc. In either case, the reference disc is distinguished by a red line on the upper side of the disc.

(8) In shifting the position of the vertical drive shaft on a frame where a reference disc is found, rotate the shaft to a position such that the red line on this disc is in alignment with the front edge of the pole piece. Then raise or lower the vertical drive shaft until the gap between the pole piece and the reference disc is satisfactory. If no driving disc is marked as a reference disc, select, as a substitute, a driving disc which is free from wobble for use in making this adjustment. This will usually locate all of the driving discs properly with respect to all of the selectors in the bay. However, should it be necessary to move an individual driving disc or to correct the gap between the pole piece and driven disc of any selector, proceed as covered below.

Individual Driving Disc Too High or Too Low With Respect to the Driven Discs

(9) If only a few driving discs are too high or too low with respect to the driven discs, stop the vertical drive shaft and loosen the

driving disc setscrew with the 4-inch E screwdriver or with the KS-6098 wrench depending upon whether the screw is a fillister head setscrew or a Bristo setscrew and raise or lower the driving disc as required. Tighten the driving disc setscrew. In order to raise the driving disc it may be necessary to raise either the pole piece or the complete drive magnet assembly as covered in (11) in order to prevent the driving disc from rubbing on the pole piece.

(10) Do not loosen the selector mounting screw or shift the position of the selector to adjust for these requirements except where this is necessary in order to loosen the pole piece or magnet mounting screws as covered in (11). With the driving disc setscrew only lightly tightened it is permissible to tap lightly on the top surface of the disc with the handle of the screwdriver to move the driving disc downward. Take care not to tap the driving disc down too far and do not tap it upward as this will groove the shaft and when the disc is raised, it will not hold its adjustment.

Where Requirement of Vertical Location of Driving Discs with Respect to the Pole Piece Cannot be Met by Raising or Lowering the Drive Disc

(11) If this condition exists, it will be necessary to raise or lower the pole piece or the drive magnet or both. To check, turn the vertical drive shaft to the position in which the driving disc setscrew is under the drive magnet. Experience has shown that this is the position in which the gap between the driving disc and the pole piece is the smallest. Then loosen the pole-piece mounting screws with the 206 and 207 offset screwdriver or the magnet mounting screws with the 4-inch E screwdriver and raise or lower the pole piece or magnet as required. Then tighten the screws. In order to obtain access to the pole-piece mounting screws, it may be necessary to remove the selector mounting screws as covered in 3.08 and pull the switch forward, taking care not to damage the wiring. In remounting the switch, make sure that the gap between driving and driven discs is met.

(12) If the requirements still are not met, move the driving disc up or down as covered in (9).

(13) ***Grooved Discs:*** In cases where the apparatus has been in service for some time with the driving disc set below the limit specified and a groove has been worn in the driven disc, it will not be necessary to relocate the driving disc to meet the requirements unless the operation of the switch indicates that such a change is desirable. In case a groove with sharp edges is worn in the driven disc, it may be necessary to replace the disc as covered in the section covering piece-part data and replacement procedures for power driven rotary selectors.

Note: A grooved driven disc for the purpose of this procedure is defined as one grooved deeply enough so that a shift in the driving disc to meet the requirement would reduce the area of contact between the driving and driven discs to such an extent that it appears that operation of the selector would be seriously affected.

3.09 ***Drive Pull*** (Reqt 2.09)

(1) If an appreciable slip between the driving and driven discs is noted, make sure that the discs are free from the slightest traces of oil or grease. To clean the discs of oil or grease, proceed as follows.

(2) Examine the flat surface of the driving disc and adjoining portion of the shaft for oily residue. If areas are wet with oil, wipe off the accumulations with a KS-14666 cloth moistened with KS-7860 petroleum spirits. Shift the cloth as required to present a clean section for each disc.

(3) Fold a clean KS-2423 cloth to form a pad 2 to 2-1/2 inches square. Moisten the cloth with the emulsion solution prepared as covered in 3.005. Squeeze the cloth lightly to remove excess solution and proceed as follows.

(a) To clean the driving disc, press the moist cloth firmly against the top and bottom horizontal surfaces and the friction surface of the driving disc during three or four revolutions of the disc. Then, while exerting pressure against the disc surfaces, use a dry KS-2423 cloth to clean and dry the driving disc during several revolutions of the disc. Normally this will adequately clean the disc. If the disc is unusually dirty, re-

peat the above cleaning and drying operations. Discard the cloth when it becomes wet or badly soiled.

(b) To clean the driven disc, block the stop magnet operated, then press the moist cloth against the disc friction surfaces and apply a forward and backward motion to rotate the selector, so that all friction surfaces are reached, taking care not to distort the driven disc spider spring. Then wipe the friction surfaces with a dry KS-2423 cloth to clean and dry the disc. Release the stop magnet.

(c) Refold the KS-2423 cloth used with the emulsion solution to present a clean surface for cleaning the next pair of discs. Rinse the cloth in the solution after cleaning each pair of discs. See 3.09(15).

(4) If the iron framework is painted with asphaltum paint, exercise care that the cloth does not come in contact with the framework as the KS-7860 petroleum spirits or the emulsion solution may dissolve the paint, which may be carried to the disc driving surfaces.

(5) If it is found that there is an appreciable slip between the driving and the driven discs after the above cleaning operation has been performed, it will be necessary to apply the 378A friction surface restorer to the driving disc as shown in Fig. 32 using the following methods.

(6) Grasp the stone on the 1/4-inch sides close to the holder and remove both the cloth and the stone simultaneously from the holder by working the stone gently from side to side to prevent breakage and at the same time exerting an outward pull. Immerse the stone in water to saturate it and fill the tube approximately 2/3 full of clean water. Place the narrow side of the cloth over the end of the stone to be inserted in the tube so that the ends of the cloth can be folded down over the wide sides of the stone. Pull over the superfluous cloth on the long narrow sides of the stone and insert the stone and the cloth in the tube. Shake the tube in a lengthwise direction to work the water out over the stone. After the entire stone has been wet in this manner, clean the end of the stone to be applied to the disc with a moistened KS-14666 cloth. Always keep the stone cleaned in this manner while using it.

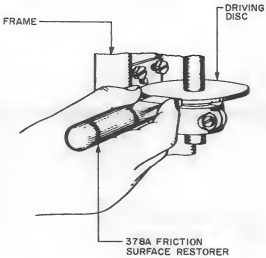

Fig. 32 – Method of Using 378A Friction Surface Restorer

(7) To keep the stone in proper condition and obtain the best results, do not permit oil or grease to come in contact with the stone. Always use the stone wet as the water prevents oil and grease from collecting in and filling the pores of the stone. Clean the used surface of the stone frequently and, when necessary, dress it flat on an R-1482 file.

(8) Energize the drive magnet, rotate the selector by hand if necessary and at the same time apply the friction surface restorer to the friction surface of the driving disc for one or two revolutions of the disc as shown in Fig. 32.

(9) De-energize the drive magnet and, with the orange stick, apply a drop of water in the gap between driving and driven discs. Energize the drive magnet and rotate the selector one or two revolutions as covered in (8) to insure that the driving surfaces of both discs are thoroughly moistened. Again de-energize the drive magnet and apply another drop of water in the disc gap. Leave the selector out of service till the water has evaporated.

(10) Rotate the selector and check for slip from time to time.

(11) Do not leave the selector while the drive magnet is energized, because if it slips or stops, immediate steps should be taken to eliminate the trouble in order to prevent smooth spots from being worn in the driven disc.

(12) If, after revolving several minutes, the selector fails to develop sufficient pull for prompt operation or has a tendency to falter or hesitate in any position, repeat the cleaning, grinding and rusting operations covered in (2), (3), (8) and (9).

(13) Recheck requirement 2.05 and if necessary, readjust as covered in 3.05.

(14) Empty the water from the case of the friction surface restorer when its use is no longer required.

(15) Discard both the KS-2423 cloth and the emulsion solution used in (3) and (12) after their use on drive discs of 30 switches. See 3.005.

3.10 ***Stop Unit Vertical Position*** (Reqt 2.10)

(1) To adjust the vertical position of the stop unit, loosen the two stop unit mounting bracket screws with the 4-inch E screwdriver just sufficiently to permit shifting the bracket, and raise or lower the bracket as required.

(2) After relocating the stop unit mounting bracket, securely tighten the mounting bracket screws.

3.11 ***Armature Back Stop Screw Position*** (Reqt 2.11)
3.12 ***Gap Between Armature and Back Stop Screw*** (Reqt 2.12)

(1) If these requirements are not met, loosen the armature back stop screw locknut with a 310B wrench, using another 310B wrench to hold the screw. Position the armature back stop screw as required and securely tighten the locknut.

3.13 ***Contact Alignment*** (Reqt 2.13)

(1) To adjust for contact alignment, loosen the spring assembly clamping screws slightly with the 3-inch C screwdriver and shift the contact springs as required. Then securely retighten the spring assembly clamping screws.

3.14 ***Contact Pressure of Stop Unit Springs*** (Reqt 2.14)
3.15 ***Pressure of Long Contact Spring Against Insulating Bushing*** (Reqt 2.15)
3.16 ***Contact Separation Between Stop Unit Springs*** (Reqt 2.16)
3.17 ***Short Contact Spring Position*** (Reqt 2.17)
3.18 ***Gap Between Insulating Bushing and Long Contact Spring*** (Reqt 2.18)

(1) To change the contact pressure, place the 179 spring adjuster or the KS-7782 pliers on the spring and slide the tool back to the base of the spring. Adjust the spring as required, exercising care not to disturb adjacent springs. In some cases, this adjustment may be facilitated by removing the retractile spring with the P-long-nose pliers.

(2) If the desired tension cannot be obtained by adjusting as covered in (1) without bowing the spring, apply the 179 spring adjuster or the KS-7782 pliers to the spring and slide the tool back to the base of the spring. Draw the tool forward the length of the spring meanwhile applying pressure as required so that the spring is formed into a gradual bow. The magnitude of the bow to be formed in the spring must be learned by experience and should be such that when the final tension adjustment is made at the base, the spring will be approximately straight. Move the adjuster to the base of the spring and adjust as covered in (1).

(3) Adjust for the contact separation and gap between insulating bushing and long contact spring as required with the 179 adjuster or KS-7782 pliers.

(4) To adjust for short contact spring position, insert a piece of 22 gauge bare tinned copper wire between the short contact spring and the spring stop. Then place the KS-7782 pliers over both the short contact spring and the spring stop near the contact end and pinch the two springs together with the pliers. Then remove the piece of wire and recheck the position of the spring. Take care in making this adjustment to prevent distorting the springs.

3.19 ***Stop Unit Horizontal Adjustment*** (Reqt 2.19)

(1) To adjust for this requirement, rotate the selector brushes to a convenient position, operate the armature and see that the stop

pawl engages the stopping edge of the associated notch in the rim. Loosen the stop unit mounting screws with the 4-inch E screwdriver or the screwdriver of the 103 combination pin wrench and screwdriver just sufficiently to permit moving the stop unit and shift the unit back or forth as required. Then securely tighten the stop unit mounting screws. In some cases, due to interference of framework and wiring, it may be necessary to loosen the selector to gain access to the stop unit mounting screws. To do this, loosen the selector mounting screws.

(2) If the requirement cannot be met, the indications are that the rotor brushes are loose in the assembly. In this case, replace the rotor brush assembly with a new one as covered in Section 026-740-801.

3.20 ***Armature Retractile Spring Tension*** (Reqt 2.20)
3.21 ***Stop Magnet Electrical Requirements*** (Reqt 2.21)

(1) If these requirements are not met, adjust the stationary retractile spring lug as required with the 325B adjuster or with the P-long-nose pliers.

3.22 ***Alignment of Tips of Rotor Brushes*** (Reqt 2.22)

(1) When checking the alignment of the tips of nonbridging rotor brushes, also make sure that the tips of bridging brushes overlap the nonbridging brushes. If this requirement is not met, the indications are that the rotor brushes are loose in the assembly. In this case, replace the rotor brush assembly with a new one as covered in Section 026-740-801.

3.23 ***Rotor Brush Alignment*** (Reqt 2.23)
3.24 ***Feeder Brush Position*** (Reqt 2.24)
3.25 ***Feeder Brush Tension*** (Reqt 2.25)
3.26 ***Rotor Brush Tension*** (Reqt 2.26)
3.27 ***Rotor Brush Prong Contact*** (Reqt 2.27)

Rotor Brush Alignment

(1) In case the majority of the rotor brushes is found to be out of alignment in the same direction with respect to the bank feeder brushes or bank terminals, loosen the selector mounting screw and the bank mounting screw and shift the bank to the right or to the left as required and then retighten the screws.

(2) Adjust an individual rotor brush spring as required with the 363 spring adjuster. Exercise care not to produce any sharp bends or kinks or otherwise distort the brushes.

(3) Advance the rotor assembly electrically for a half revolution or until the opposite ends of the rotor brushes are about to pass onto the bank feeder brushes or bank terminals and repeat the above adjustment.

Feeder Brush Position

(4) Adjust the feeder brushes as required with the 363 spring adjuster or with the KS-7782 pliers.

(5) In the case of the detachable brushes, it may be necessary to loosen the detachable feeder brush unit mounting nut with the 417A wrench and shift the unit, making use of the play in the mounting hole. If this does not permit the required adjustment, remove the detachable feeder brush assembly from the mounting stud and change the number of spacing washers as required.

Feeder Brush Tension

(6) ***Single-Piece-Type Feeder Brushes per Fig. 18a, 18b, 19a (balanced type):*** If necessary to adjust the brush, apply the 363 spring adjuster to the front prong just above the crotch and adjust as required. In case the rear prong does not make contact with the rotor brush hub, insert the 456A adjuster between the feeder brushes and adjust the rear prong so that it contacts with the rotor brush hub. Then recheck the tension of the front prong. Make an effort to have the pressure on each of the two prongs approximately equal. This may be accomplished if the feeder brush is kept free of bows or kinks.

(7) ***Single-Piece-Type Feeder Brushes per Fig. 19b:*** If necessary to adjust the brush, place the 363 spring adjuster close to the base of the brush and apply a turning motion, taking care not to distort the brush. Make sure that the part of the bank feeder brush over which the rotor brush passes is not out of alignment with the first row of bank terminals

by more than the specified amount and if necessary, readjust with the KS-7782 pliers by grasping the brush above the point at which the rotor brushes make contact and moving the pliers toward the top, at the same time giving them a twisting motion in the direction of the desired tension.

(8) ***Two-Piece-Type Feeder Brush per Fig. 20:*** Place the 363 spring adjuster one one of the individual springs of the feeder brush to be positioned as near the base of the spring as possible and with an upward wiping motion of the adjuster, tension the spring in the proper direction. Repeat for the other spring of the feeder brush.

Rotor Brush Tension

(9) To adjust an individual rotor brush spring, apply the 363 spring adjuster to the base of the brush spring close to the shaft of the rotor brush assembly. In the case of detachable feeder brushes, it may be necessary to advance the selector one or two steps to adjust the springs close to the shaft of the rotor brush assembly after which restore the rotor brush assembly to its previous position to check adjustment. Take care in adjusting the brush springs not to change the alignment of the brush contact edges. This is especially important on bridging brushes where such improper adjusting would shorten the contact surface.

(10) When tests and adjustments have been completed on one brush end of the rotor brush assembly, rotate the selector to a position where the opposite brush end is in the proper position and resting upon the top row of terminals in the bank on the detachable feeder brushes when installed, and repeat the tests and make the necessary readjustments as covered in (9).

Rotor Brush Prong Contact

(11) On selectors equipped with two-piece-type feeder brushes which are not in alignment with their associated bank terminals within 0.010 inch at the point where the rotor brushes pass over them or which have a separation between the halves at this point of more than 0.005 inch, it will be advisable to check or adjust for this requirement on the first row of bank terminals instead of on the feeder terminals.

(12) To adjust the prongs, set the rotor brush assembly approximately in a horizontal position. Apply a 363 spring adjuster near the base of the prongs to hold the brush steady and adjust the outer prongs as required with another 363 spring adjuster and the inner prongs with the 456A adjuster. Make an effort to adjust the prongs of the individual brush member so that both prongs contact the feeder brush.

3.28 ***Toeing of Bridging Brushes*** (Reqt 2.28)

(1) To adjust for this requirement, rotate the selector until the brushes are approximately in a horizontal position. Then hold the heel of the brush with one 363 spring adjuster and use a second 363 spring adjuster on the contact portion of the brush to produce the required "toeing out" as shown in Fig. 33. Take care not to distort the brush when applying this adjustment.

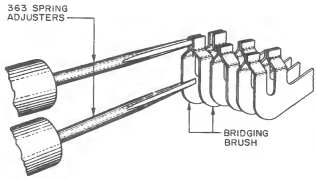

Fig. 33 – Method of Adjusting Toeing of Bridging Brushes

3.29 ***Heel Spacing*** (Reqt 2.29)
3.30 ***False Contacting*** (Reqt 2.30)

(1) Adjust the brushes close to the heels as required with a 363 spring adjuster as shown in Fig. 34. When detachable feeder brushes are installed, it will be necessary to advance the selector beyond these brushes to adjust the springs, after which return the rotor brush assembly to its previous position and recheck the adjustment. Recheck requirements 2.23, 2.26, and 2.28.

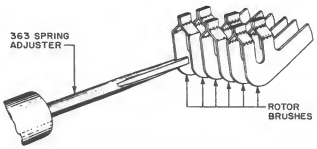

Fig. 34 – Method of Adjusting for Heel Spacing and False Contacting

3.31 ***Application of P-10A768 Attachable Stop*** (Reqt 2.31)

(1) Remove the stop magnet cover. Unsolder and tag the magnet leads. With the 4-inch E screwdriver, remove the stop unit frame mounting screws and remove the stop unit taking care not to damage the leads to the spring assembly. Then with the screwdriver, remove the magnet mounting screw and remove the coil. Remount the stop unit loosely on the selector to prevent putting a strain on the leads.

(2) Remove the portion of the core cap remaining on the pole face by peeling it off with the P-long-nose pliers. Then with the pliers, press against the spoolhead any ragged edges of the core cap remaining at the periphery of the core. Make sure that the remaining portion of the cap is underflush with respect to the pole face. Do not attempt to remove this portion of the cap.

(3) Remove the stop unit from the selector taking care not to damage the leads. Apply the stop to the armature as follows. Move the armature away from the back stop screw and insert the long leg of the stop between the armature and screw. At the same time, position the end of the long leg behind the armature bearing pin and the U-shaped end of the stop over the front of the armature. Make sure that the stop rests flat along the rear edge of the armature, and the back stop screw clears the periphery of the hole in the stop when the armature is in the unoperated position.

(4) Remount the coil in the stop unit frame with the locating pin in the frame engaging the slot in the end of the magnet core. Tighten the mounting screw with the screwdriver. Remount the stop unit on the selector by securely tightening the screws and resolder the magnet leads. Remount the cover.

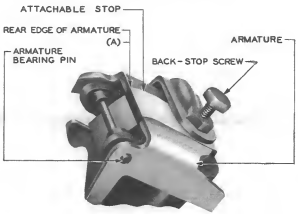

Fig. 35 – P-10A768 Attachable Stop Mounted on Armature of Stop Magnet

REASONS FOR REISSUE

1. To omit information covering definition of one dip of KS-2832 lubricant (1.05 of previous issue).
2. To add information covering the preparation of KS-16832 L2 lubricant (1.05).
3. To add information covering definition of one dip of KS-16832 L2 lubricant (1.06).
4. To omit information covering definition of one discharge of Veedol medium cup grease (1.06 of previous issue).
5. To add information covering definition of one discharge of Veedol All Purpose grease (1.07).
6. To add Fig. 18a and 18b.
7. To revise Table A.
8. To add requirements for feeder brush tension for single-piece-type feeder brushes provided with welded contacts (2.24 and 2.25).
9. To revise the List of Tools, Gauges, Materials, and Test Apparatus (3.001).
10. To add information covering preparation of emulsion solution (3.005).
11. To revise procedures covering drive pull (3.09).
12. To add procedures covering feeder brush tension for single-piece-type feeder brushes provided with welded contacts and for two-piece-type feeder brushes [3.23 through 3.27(6) and (8)].